

Application No. 09/780,737
Amendment dated August 20, 2004
Reply to Office Action of May 5, 2004

4

REMARKS

All of the pending claims of the present application have been rejected in view of certain prior art references. In particular, claims 1, 4-5, and 15-18 are rejected as being anticipated under 35 U.S.C. §102(e) by the U.S. Patent No. 6,320,563 to Yang et al. The remaining claims have been rejected as being obvious in view of the '563 patent to Yang in combination with the other references, namely, U.S. Patent No. 5,748,277 to Huang et al. (claim 3); U.S. Patent No. 6,268,839 to Yang et al. and in further view of U.S. Patent No. 6,094,187 to Jones et al. (claims 6, 11 and 13-14); the article to Huang "Unipolar implementation for the dynamic drive ..." (claims 7-8); U.S. Patent No. 6,133,895 to Huang (claim 9); and Yang '839 in view of U.S. Patent No. 6,133,895 to Huang (claims 10, 12 and 19).

Prior to discussing the merits of the substantive rejections it is believed that a review of the primary reference is warranted. U.S. Patent No. 6,320,563 (hereinafter the '563 patent) is directed to a dual frequency cholesteric display which selectively applies high and low frequency voltage pulses to a plurality of pixels formed by electrodes on opposed substrates. The application of high frequency voltage pulses causes the liquid crystal material between the substrates to exhibit one texture and application of the low frequency voltage pulses causes the material to exhibit another texture. By adjusting voltage amplitude values for each high and low frequency, each pixel is driven to exhibit a desired reflectance. Use of such a drive scheme takes advantage of the cholesteric liquid crystal material's "cumulative effect." In other words, switching between the planar texture and the focal conical texture is accomplished by applying successive multiple voltage pulses. This allows for reduced application of voltage or pulse duration to incrementally change the reflectance of the liquid crystal material.

Application No. 09/780,737
Amendment dated August 20, 2004
Reply to Office Action of May 5, 2004

As acknowledged at column 4, lines 17-26 of the cited reference, the drive scheme controls the amount of reflection in each pixel by applying a voltage across the electrodes to the liquid crystal material. In particular, the drive scheme controls the voltage's amplitude, frequency and polarity. Controlling each of these variables at each electrode produces the desired reflectance at each selected pixel. Indeed, the cumulative effect can be used such that the application of multiple pulses allows the liquid crystal material to switch between textures step by step according to the number of pulses applied. Accordingly, the amplitude and/or the duration of the pulses can be reduced, thus increasing the speed in which the display is addressed and the image produced. Such a scheme allows for the material not to be driven from one state or texture to another by one long pulse, but instead utilizes the direct transition from the planar texture or the focal conical texture or vice versa. As such, the use of short pulses to incrementally achieve the desired reflectance may be used.

Although the dual frequency drive scheme is effective, it only provides for quasi-video rate cholesteric displays. In other words, use of such a drive scheme, although an improvement in the art, still provides flicker in the display and is not suitable for use in high quality video rate displays. It will be appreciated that a cumulative-type display, that is one that increases or decreases a reflectance value based upon a cumulative drive scheme, provides for no set time period in which a desired reflectance value can be obtained. In other words, the controller must apply continuous voltage pulses to the material until a desired reflectance value is obtained and as such, if extreme reflectance values are needed, a longer time period is required to obtain the desired reflectance value and this adversely affects the ability to obtain video images that do not produce a flicker.

Another drawback of the '563 patent is that it requires the use of a dual frequency cholesteric material. As such, the controlling mechanism must, in addition to being able to apply different voltage values, be able to apply significantly different frequency values in association with those voltage values.

It must be remembered that anticipation under 35 U.S.C. § 102 requires the presence in a single prior art reference a disclosure of each and every element of the claimed invention, arranged as in the claim. *Connell v. Sears Roebuck & Co.*, 722 F.2d 1542, 1548, 220 U.S.P.Q. 193, 198 (Fed. Cir. 1983). Thus, for an anticipation rejection to stand, all limitations of the claim must be found in the reference or be fully met by it.

Application No.: 09/780,737
Amendment dated: August 20, 2004
Reply to Office Action of May 5, 2004

It is respectfully submitted that there are several limitations in independent claims 1 and 15 that are not expressly taught or suggested by the '563 patent. Claims 1 and 15 set forth that a predetermined number of pulses are applied to the first and second plurality of electrodes within a set period of time and wherein each pulse has a different drive duration period within the set period of time. It is asserted by the Examiner that these particular limitations are set out at column 4, lines 9-23. It is submitted that after a close analysis, this teaching does not teach or suggest the limitations claimed. Accordingly, the cited passage is set out in full:

Through its drive scheme, the dual frequency display takes advantage of the cholesteric liquid crystal's cumulative effect. In other words, switching between the planar texture and the focal conic texture is accomplished by applying multiple voltage pulses. This allows for reduced application of voltage or pulse duration to incrementally change the reflectance of the liquid crystal material. Accordingly, the drive scheme can be used to provide a quasi-video rate display. The drive scheme controls the amount of reflection at each pixel by applying a voltage across the electrodes to the liquid crystal material. In particular, it controls the voltage's amplitude, frequency, and polarity. Controlling each of these variables at each electrode produces the desired reflectance at each selected pixel.

Application No. 09/780,737
Amendment dated August 20, 2004
Reply to Office Action of May 5, 2004

Absolutely nothing in this passage teaches or suggests applying multiple voltage pulses in a set period of time and that each pulse has a different duration drive period within the set period of time. Schematic examples of this limitation are set out in Figs. 4-7 of the application. It is submitted that the cited passage simply teaches the general application of voltage pulses so as to utilize the dual frequency material's cumulative effect. As discussed further in the '563 patent, at column 7, lines 4-10, cumulative effect is used to drive the liquid crystal material between textures, step by step, corresponding to the number of pulses applied. As noted at column 4, lines 49-50, 250 millisecond pulses of the AC square wave were used and thus all pulses in the cited reference are of the same duration, but with different frequencies and amplitudes depending upon the desired texture. No express teaching is provided that the duration of the pulses is varied. And, any number of pulses for any period of time may be applied to obtain the desired reflectance property. This is in distinct contrast to the claimed invention which requires that the desired reflectance be obtained within a set period of time. Moreover, nothing in the '563 patent teaches that each pulse applied within the set period of time is of a different duration drive period. Therefore, each and every element of the claimed invention is not present in the cited reference.

It is further asserted that column 4, lines 9-23 of the '563 explains that the cumulative drive scheme includes "reducing the application voltage (amplitude) or pulse duration (period) to incrementally change the reflectance of the liquid crystal material." It is respectfully submitted that this passage still provides absolutely no teaching or suggestion in regard to each pulse within a set period of time having a different drive period. Although the reference discloses adjusting amplitude, frequency and polarity, there is absolutely no specificity to this teaching in regard to a set period of time or that the pulses within the set period of time each have a different value.

Application No.: 09/780,737
Amendment dated: August 20, 2004
Reply to Office Action of May 5, 2004

Claims 1 and 15 also set forth that one of two amplitude values is selectively associated with at least one of the predetermined number of pulses applied to the electrodes to generate a desired incremental reflectance for each of the pixels, wherein the desired incremental reflectance is determined by which one of the amplitude values is associated with which one of the different duration drive periods. By way of example, Fig. 5B of the application shows where the first pulse has a second value and that the remaining pulses are of a first value and wherein all of the pulses have different duration time periods. It is asserted by the Examiner that column 4, lines 9-16 of the '563 patent teaches that the dual frequency display functions by utilizing the incremental reflectance nature of the cholesteric display, where the desired incremental reflectance is determined by the amplitude of the different drive periods. It is respectfully submitted that the desired incremental reflectance of the claimed invention is determined not only by the amplitude of the different drive periods, but by the different duration drive periods within a set period of time. Nor does the '563 teach that the amplitude is one of two values specifically associated with one of the different duration drive periods to obtain a desired reflectance. Therefore, each and every element is not taught in the '563 patent and the independent claims 1 and 15 should be passed to allowance.

Dependent claims 4 and 17 set forth that each of the different duration drive periods are applied to the first and second plurality of electrodes at the same time. The Examiner asserts that the '563 patent discloses that different frequency pulses are applied to the first and second plurality of electrodes at the same time. But this is not the subject matter of the claim. The claims are directed to different drive periods (not different frequency pulses), which are applied in the set time period, wherein the different duration drive periods are applied to the first and second plurality of electrodes at the same time. The '563 patent clearly does not teach that different duration drive periods within a set period of time are applied to the electrodes at the same time. Therefore, each and every element of claims 4 and 17 are not taught in the cited reference and should be passed to allowance.

Application No.: 09/760,737
Amendment dated: August 20, 2004
Reply to Office Action of May 5, 2004

In regard to claims 5 and 18, the Examiner asserts that Yang discloses the number of predetermined pulses correspond to a different number of incremental reflectances. It is respectfully submitted that Yang does not associate the number of incremental reflectances with a predetermined number of pulses. As noted previously, the '563 patent employs a cumulative drive scheme and as such, can obtain any number of reflectance values based upon the number of times the cholesteric material is "bumped" by application of an increased voltage amount. In the present application, the number of incremental reflectances specifically correspond to the number of different duration drive periods within the set period of time. Such a teaching is not present in the '563 patent and it is respectfully submitted that claims 5 and 18 are allowable on their own merit.

The Examiner has rejected claim 6, 11 and 13-14 under 35 U.S.C. §103(a) as being unpatentable over the '563 patent and in view of U.S. Patent No. 4,268,839 to Yang et al. and further in view of U.S. Patent No. 6,094,187 to Jones et al. The Examiner acknowledges that the '563 patent does not go into specifics of where a number of reflectances at each pixel is equal to two raised to the number of the predetermined pulses less one, or less a constant value. To overcome this deficiency, the Examiner alleges that Jones teaches temporal modulation using a binary weighted system in obtaining grey scale and pixels and specifically refers to column 2, lines 51-54 and lines 61-64.

It is respectfully submitted that the Examiner has failed to make out a *prima facie* case of obviousness in this regard and as much as there is no teaching or suggestion in the teachings of the '563 patent, which is directed to a dual frequency cholesteric liquid crystal material, and the '839 patent which uses a cholesteric liquid crystal material, in combination with the teachings of Jones which utilizes a ferroelectric liquid crystal material. One skilled in the art is simply not motivated to review such divergent liquid crystal technologies inasmuch as the operating properties of ferroelectric liquid crystal materials and cholesteric liquid crystal materials are significantly different. Thus, there is absolutely no suggestion or motivation to combine the references as suggested by the Examiner. Therefore, a *prima facie* case of obviousness has not been made and claims 6, 11 and 13-14 are allowable on their own merit.

Application No. 09/780,737
Amendment dated: August 20, 2004
Reply to Office Action of May 5, 2004

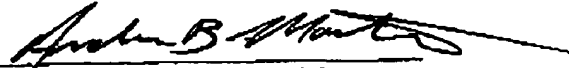
Claim 9 has been rejected under 35 U.S.C. §103(a) as being unpatentable over the '563 patent and in further view of the patent to Huang, U.S. Patent No. 6,133,895. The Examiner expressly acknowledges that Yang does not explicitly disclose a method wherein the number of predetermined number of pulses is equal to a number of incremental reflectances. To overcome this deficiency, the Examiner alleges that the '839 patent at column 2, lines 4-9 discloses a general drive scheme with a series of voltage pulses that produce various levels of reflectances. Further, it is alleged that it would be fitting to implement Huang's grey scale method disclosed at column 2, lines 37-40 where distinct reflectance states can be reached in correspondence with each pulse. However, the proffered teachings do not provide any basis for asserting that the number of pulses is equal to the number of desired incremental reflectances, wherein the number of pulses are applied within a set period of time. Therefore, it is respectfully submitted that a *prima facie* case of obviousness has not been made and that claim 9 is allowable on its own merit.

The Applicant, Mr. Huang, and his attorney thank the Examiner for discussing the merits of the attached claims at the interview conducted on August 16, 2004. As set out in the Interview Summary, the independent claims 1 and 15 were discussed in view of the primary reference to Yang, U.S. Patent No. 6,320,563. No exhibits were provided and the arguments presented mirror those presented in this response. The outcome set out in the Interview Summary is agreed to and the clarifying amendments are included in this response. In view of the Interview Summary and this response, it is submitted that all of the pending claims are allowable and that a formal Notice of Allowance be issued for the same.

A Request for One-Month Time Extension is attached along with a check in the amount of \$110.00 (large entry). In the event the fee required for the filing of these documents is not enclosed or is deemed insufficient, the Assistant Commissioner for Patents and Trademarks is hereby authorized to withdraw the required funds from Deposit Account No. 18-0987. If a withdrawal is required from Deposit Account No. 18-0987, the undersigned attorney respectfully requests that the Assistant Commissioner for Patents and Trademarks cite Attorney Docket No. KDS.P0001 for billing purposes.

Application No.: 09/780,737
Amendment dated: August 20, 2004
Reply to Office Action of May 5, 2004

Respectfully submitted,



Ray L. Weber, Reg. No. 26,519
Andrew B. Morton, Reg. No. 37,400
Renner, Kenner, Greive, Bobak, Taylor & Weber
First National Tower - Fourth Floor
Akron, Ohio 44308-1456
Telephone: (330) 376-1242
Facsimile: (330) 376-9646
E-mail: morton@rennerkenner.com

Attorney for Applicants

August 20, 2004